CASE REPORT

Haemothorax following Percutaneous Nephrolithotomy for Complete Staghorn Calculus

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ABSTRACT

Anaesthesia for percutaneous nephrolithotomy using supracostal access for complex calculus problems poses unique challenges in terms of pulmonary injuries, haemorrhage, fluid absorption, dilutional anaemia and hypothermia.

Keywords: Renal calculi, Supracostal, Percutaneous nephrolithotomy, Haemothorax.

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INTRODUCTION

Urologic surgery for renal calculus disease has evolved over the years with a trend toward minimally invasive procedures. Percutaneous nephrolithotomy (PCNL) for staghorn calculus provides a direct approach to the calculus with a lower rate of surgical trauma to the kidney and its surrounding structures compared to open surgery. The technological refinements and increased surgical experience have ensured better safety, still complications can occur and bleeding continues to be the most feared and worrisome issue.

CASE REPORT

A 58 year old well-controlled hypertensive and diabetic patient was scheduled for PCNL for a complete right staghorn calculus. All routine investigations were within normal limits. General anaesthesia was induced with propofol 2 mg/kg body weight and with vecuronium 0.1 mg/kg body weight as the muscle relaxant after securing a peripheral venous access and standard monitoring (ECG, NIBP, EtCO₂ and SpO₂). Intravenous fentanyl and oxygen in nitrous oxide with isoflurane were used for the maintenance of anaesthesia.

PROCEDURE

Cystoscopy, retrograde ureteropyelography and ureteric catheter insertion were performed with patient in lithotomy position. The patient was then turned prone for PCNL. Repeated attempts were required to enter the collecting system of kidney. Finally, through three tracts and one Y tract, the PCNL procedure was performed in 3 hours using a supracostal access. About 2500 ml crystalloid and 500 ml starch intravenous fluid were transfused during the procedure. The total irrigation time for PCNL was 150 minutes with about 500 ml blood loss. The patient was turned supine and his trachea extubated after reversal of the residual neuromuscular blockade with neostigmine.

POSTOPERATIVE COURSE

The patient was transferred to postoperative ward with stable haemodynamic parameters on 3L O₂ by facemask with SpO₂ of 100%. Intravenous crystalloids 125 ml/hr were ordered postoperatively. Two units of blood were ordered to be transfused as the haemoglobin at this stage was 7.2 gm%. Patient complained of pain and developed shivering with a heart rate of 120/min, 6 hours postoperatively, when the second unit of blood transfusion was nearing completion. A titrated boluses of opioid (fentanyl 0.5-1 μg/kg body weight) helped in providing pain relief. Haemoglobin levels came down to 5.7 gm% after second unit of blood transfusion. At about the same time, patient complained of difficulty in breathing with a recorded SpO₂ of 88%. On chest auscultation, there was markedly decreased air entry throughout the right hemithorax with heart rate 100/min, blood pressure 100/60 mm Hg and respiratory rate of 32/min. An urgent chest X-ray revealed a complete whiteout on the right side (Fig. 1). Two more units of blood were prescribed and arrangements were made for urgent chest tube insertion and ultrasonography to rule out any perirenal collection/haemorrhage. A chest tube was placed under ultrasound guidance in the posterior axillary line in the 6th intercostal space under local anaesthesia (Fig. 2) and 1250 ml of haemorrhagic fluid (altered blood) was aspirated. Intravenous 15 mg pentazocine was given for analgesia. Subsequently, the patient became comfortable with a heart rate 86/min, blood pressure 120/70 mm Hg and SpO₂ improved to 100% breathing oxygen enriched air.

DISCUSSION

Anaesthesia during PCNL for staghorn stones poses challenges due to the possibility of fluid absorption,
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Fig. 1: Postoperative chest X-ray showing complete whiteout

Fig. 2: Chest X-ray following ICD placement

dilutional anaemia, hypothermia and blood loss. In this case, the two significant observations were having difficulty in accessing the calyceal system and about 500 ml blood loss. Also, in this case, the surgeon used a supracostal access after initial difficulty with routine approach to the collecting system. Blood loss in procedures involving fluid irrigation is notoriously difficult to assess. The incidence of blood transfusion after PCNL has been 2 to 45% among different series. Multiple renal punctures and renal pelvic perforation are associated with a two fold greater blood loss. Kukreja et al\(^1\) found that diabetes mellitus, multiple tract procedures and a prolonged operative time were associated with significantly greater blood loss. Large bulk stones, specifically staghorn stones, are more likely to be associated with bleeding and the need for transfusion. In a multivariate analysis, staghorn stones and multiple tracts were independent predictors of bleeding.\(^2\)

Associated arteriosclerosis in a patient with diabetes mellitus and hypertension may make such patients more prone to bleeding during the tract formation. PCNL can require a longer operating time, especially with increasing stone size besides a larger volume of irrigant fluid and need for multiple tracts to achieve better stone clearance. Supracostal access is normally achieved above the 12th or 11th rib and has a potential for injury to the pleura and/ or lung. The parietal pleura is reflected to the level of the 10th rib in the midaxillary line and variable along the 12th rib posteriorly. The visceral pleura never descends to the level of the midpoint of 12th rib except with forced ventilation. Therefore, all tracts that pass above the 12th rib pierce the diaphragm.\(^3\) Entry through the pleural space may lead to an accumulation of fluid causing hydrothorax. Haemothorax secondary to laceration of the intercostal artery may also develop, which may be avoided by staying immediately above the upper border of the lower rib.

According to available literature, pulmonary injury caused by transgressing the lungs via the posterior supra 12th rib intercostal approach is likely to occur in 14% of cases on the left side and 29% on the right side.\(^4\) Supracostal approach above 11th rib is associated with 23.1% intrathoracic complications compared with 1.5 to 12% for above 12th rib approach and 0.5% for subcostal approach to access the collecting system.\(^5\)

CONCLUSION

A high index of suspicion should be maintained when PCNL is performed for complete staghorn calculi, especially with prolonged operating time, multiple tracts and supracostal access. Anaesthesiologist should be aware of the possibilities of fluid absorption, dilutional anaemia or significant blood loss.\(^6\)

A close working relationship between the surgeon and anaesthetist is essential to coordinate the access puncture with deflation of the lung and ventilator standstill to minimize the chances of pleural injury. A chest X-ray in the immediate postoperative period should be performed to rule out acute hydrothorax/haemothorax.

REFERENCES


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